DOCUMENT RESUME

ED 370 810 SE 054 582

AUTHOR	Ely, Donald P.; Huberman, A. Michael
TITLE	User-Friendly Handbook for Project Dissemination: Science, Mathematics, Engineering, and Technology Education.
INSTITUTION	National Science Foundation, Washington, DC. Directorate for Education and Human Resources.
REPORT NO	NSF-94-17
PUB DATE	94
NOTE	21p.; For a related document, see ED 366 511.
PUB TYPE	Guides - Non-Classroom Use (055)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Elementary Secondary Education; Higher Education; *Information Dissemination; Program Evaluation; Science Education
IDENTIFIERS	*National Science Foundation

ABSTRACT

This document was developed to provide principal investigators and project evaluators working with the National Science Foundation's Directorate for Education and Human Resource Development (EHR) with a basic understanding of dissemination. It is aimed at people who want to learn more about both developing and implementing a dissemination plan. It complements the "User-Friendly Handbook for Project Evaluation, Science, Mathematics, Engineering, and Technology Education." Dissemination guidelines are included. (Author/ZWH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 370 810

Directorate for Education
and Human Resources

Division of Research,
Evaluation and Dissemination

User-Friendly Handbook for Project Dissemination: Science, Mathematics, Engineering and Technology Education

Donald P. Ely

A. Michael Huberman

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SE 054 582

BEST COPY AVAILABLE

The Foundation provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

The Foundation welcomes proposals from all qualified scientists and engineers, and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research and related programs described here.

In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on an NSF project. See the program announcement or contact the program coordinator at (703) 306-1633.

Privacy Act and Public Burden

Information requested on NSF application materials is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be used and disclosed to qualified reviewers and staff assistants as part of the review process and to other government agencies. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposals File and Associated Records," 56 Federal Register 54907 (Oct. 23, 1991). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

The public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Herman G. Fleming, Reports Clearance Officer, Division of CPO, NSF, Arlington, VA. 20330; and the Office of Management and Budget, Paperwork Reduction Project (3145-0058), Wash., D.C. 20503.

The National Science Foundation has TTD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. This number is (703) 306-0090.

Directorate for Education
and Human Resources

Division of Research,
Evaluation and Dissemination

User-Friendly Handbook for Project Dissemination:

Science, Mathematics, Engineering and Technology Education

Donald P. Ely

A. Michael Huberman

ABOUT THE AUTHORS

Donald P. Ely was a Program Director for Dissemination in the Division of Research, Evaluation, and Dissemination (DRED) at the National Science Foundation. He is a Professor of Instructional Design, Development, and Evaluation in the School of Education at Syracuse University. His current research is on the conditions that facilitate the implementation of educational innovations and trends in educational technology.

A. Michael Huberman is a Professor of Education in the Department of Psychology and Education Services at the University of Geneva, Switzerland. During 1991-1993, he is a Senior Research Associate at The Network in Andover, Massachusetts, and Visiting Professor in the Graduate School of Education at Harvard University. He is also a Senior American Educational Research Association (AERA) Fellow in the Division of Research, Evaluation, and Dissemination at the National Science Foundation. His current research deals with the dissemination of educational innovations and qualitative research methodologies.

Additional writing and editing by the staff of Booz·Allen & Hamilton Inc.

Any opinions (including definitions of dissemination), findings, and conclusions or recommendations expressed in this publication are those of the authors, and do not necessarily reflect the views of the National Science Foundation.

PREFACE

This document was developed to provide Principal Investigators and Project Evaluators working with the National Science Foundation's Directorate for Education and Human Resource Development (EHR) with a basic understanding of dissemination. It is aimed at people who want to learn more about both developing and implementing a dissemination plan. It complements the "User-Friendly Handbook for Project Evaluation, Science, Mathematics, Engineering, and Technology Education" which is also available from NSF.

DISSEMINATION GUIDELINES

The National Science Foundation strongly believes in the importance of disseminating the findings of successful projects. The purpose of this document is to provide guidelines for NSF grantees in thinking about, and planning for, the dissemination and implementation of project results.

What Is Dissemination?

". . . to scatter widely, as in sowing seed. . . to spread abroad. . ." are Webster's definitions. Most people would say that dissemination is the process of getting information and products to potential users. Unfortunately, that view is not sufficient. Without working on the **reception** side, you may have a message that virtually no one listens to, much less acts on.

For a long time, researchers in the social sciences aligned themselves with engineers. The idea was that a rational research and development process (Research —>Development —>Dissemination) would be sufficient to do the job. As it turned out, what is needed in the social and behavioral sciences is a more complex and less linear model for transferring knowledge from developers and researchers to users. Here is a definition that more accurately reflects the complexity of the process:

Dissemination is the process of communicating information to specific audiences for the purpose of extending knowledge and, in some cases, with a view to modifying policies and practices.

Within the definition are concepts dealing with four different goals of dissemination: **spread** of information, **choice** of alternative products or procedures, **exchange** of information, and **implementation** of new processes or procedures (Klein, 1992). Let us explore these four goals.

When **spread** is the focus of the dissemination effort, a variety of media formats are usually considered, e.g., audio, video, or text, using one or more vehicles: presentation at professional meetings, publications in journals and telecommunications. Spread is usually aimed at a large number of people and reaches them at random. A targeted spread would define audiences

more narrowly and confine communication to those journals read by the specific audience; to those conferences attended by the defined audience; and to telecommunications networks that are likely to include members of the target group.

Dissemination as **choice** involves the communication of information about alternative products, practices, programs, and policies. It is delivered by libraries, information centers and clearinghouses. Its function is to help users to locate needed information that is not usually available at their fingertips. With easier access to databases online and toll-free telephone numbers, information can be obtained so that choice of relevant data can be made. However, for successful dissemination, the information must be put into the system and users must become aware of its availability. Placement of information into a database is no guarantee of eventual dissemination; it occurs only when someone knows enough to request it.

Placement of information in a database is no guarantee of eventual dissemination; it occurs only when someone knows enough to request it.

Exchange occurs when information, products or observations are shared. Examples of exchange involve interactive communication through face-to-face visits, e-mail messages, and informal conversations at professional meetings. The "audience" is usually smaller—individuals or small groups who sometimes form networks for the purpose of sharing research findings, new information, and availability of materials.

Implementation is the actual use of information by other practitioners and is fostered by direct assistance to the user. It may include training in the use of a new product or procedure through a local team trained by the original developer; it may be a "help" screen on a computer or a toll-free telephone number that facilitates implementation. Implementation is actually one of the major purposes of dissemination. It is often assumed to occur simply because information has been sent. Crandall (1989) concludes:

> **"Policies that involve clearly defined and validated practices, when linked with in-person assistance from experienced developers, implementors, and facilitators, appear to have a greater chance for improving school practice."**

Dissemination is context dependent. People in vari-

ous settings often act on the basis of traditions and values of the organization. There are general procedures or guidelines that are useful but absolute rules do not exist.

What Is a Dissemination Plan?

Like any organized procedure to accomplish specific results, a dissemination plan is deceptively simple. At first it may seem like a list of activities that have been organized to communicate a message to people who want (or ought) to receive it. However, a broader definition of dissemination is employed here. Greater complexity emerges and the need for a specific plan is evident. Before actually writing a plan, think about the following questions:

Why? What is the **purpose** of the dissemination effort? What should happen as a result? What difference should it make? Why bother?

Who? Who are the ultimate users of the product or practice? Should the users be reached directly or through intermediaries? How many people are in the **audience** and where are they located? Is there a secondary audience?

What? What is the **content** that is to be disseminated? Is it new knowledge? What form is it in? If it is a product, does it require any type of training or assistance to ensure its proper use?

How? What **means** or **media** could be used to disseminate the knowledge or products? Should several media be used? What are the most cost-effective ways to reach the defined audience? Are prospective users more likely to seek information from one source than another?

With What Consequences? What does one expect to see if the dissemination is a **success**? Where will it make a difference? Are we fostering awareness? adoption? greater knowledge? enlightenment? enhanced capacity? changes in ongoing policies and practices? Without knowing which level of outcome we are after, it is practically impossible to make a dissemination plan.

Getting Started

There is no universal formula for successful dissemination. Still, if you can answer the why? who? what? etc. questions above, you will be at least halfway there. Beyond that, there are only a few "rules of thumb."

- Words on paper alone won't get far. If you want potential users to really understand and use your product or innovative practice, you will need to interact with people.
- Work as much as possible through existing channels, networks, and associations. They will carry your messages to the people who are likely users.
- Begin planning for dissemination early in the project; this allows you to prepare the ground. Waiting until the end often means that your public is going to face a steeper learning curve than you did.
- Try to stay with your dissemination long enough to measure its actual impact and assure quality control.

A good rule of thumb is to assign a 3–5% of the project budget to dissemination and allow about 18 months for this phase of the project.

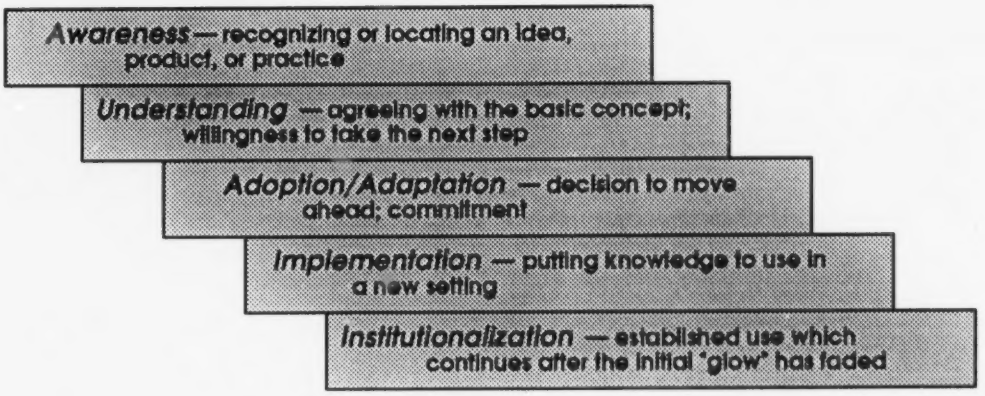
Building the Plan: Decisions

A dissemination plan usually involves five major decisions: (1) defining the purpose; (2) identifying the audience; (3) stating content; (4) designing strategies; and (5) assessing impact. Each step will be discussed in the following sections. It is sometimes necessary to return to earlier steps during the process.

Decision Point #1 — Defining the purpose

One of the first decisions is to determine the desired purposes. A linear continuum helps to review the options in terms of goals to be reached. As one moves along the continuum, increasing effort is required to achieve the goal.

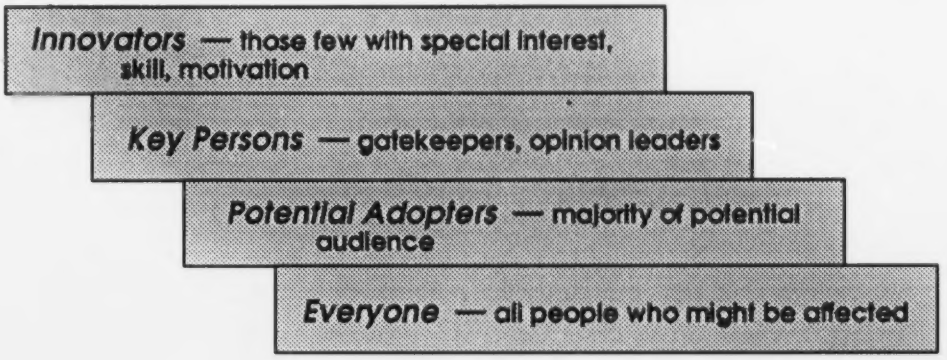
Some NSF dissemination initiatives stop at the level of awareness or understanding. This level might be acceptable for some projects but, if practices or products are to be adopted and implemented, further steps have to be taken. These additional steps require more time and, usually,


Awareness — recognizing or locating an idea, product, or practice
Understanding — agreeing with the basic concept; willingness to take the next step
Adoption/Adaptation — decision to move ahead; commitment
Implementation — putting knowledge to use in a new setting
Institutionalization — established use which continues after the initial "glow" has faded

more funds. The question for Decision Point #1 really involves two considerations: the desired level of dissemination and the available resources.

Decision Point #2 — Identifying the audience

The next decision involves specification of the audience to be reached. Sometimes there may be primary and secondary audiences. Think in terms of specific people and what they already know prior to exposure to this new information. Also consider the number of people who should be reached. The names may not necessarily be stated but can be translated into such descriptors as "department chair," "principal," or "president of the teacher's union."


Innovators — those few with special interest, skill, motivation
Key Persons — gatekeepers, opinion leaders
Potential Adopters — majority of potential audience
Everyone — all people who might be affected

It may be helpful to look at the first two decision points using a matrix that focuses on those elements as shown in Exhibit 1.

To use the matrix, name the persons who will be involved and determine the category into which they

BEST COPY AVAILABLE

Exhibit 1

A Matrix to Assist in Developing a Dissemination Strategy				
Level	Audience			
	Innovators (Special Interest)	Key Persons (Gatekeepers)	Potential Adopters	Everyone Who Might Be Affected
Awareness				
Understanding				
Acceptance				
Adoption				
Implementation				
Institutionalization				

fall. Next, indicate the level you want each person to reach. If the Principal Investigator wants the university professor of computer science to be aware, an "x" would be placed in the "special interest" column opposite "awareness." For another purpose, say the "adoption" of the ideas by the "chair of the computer science department," an "x" would be placed at that intersection and a dissemination plan would be developed with that focus in mind.

Decision Point #3 — Stating Content

Content is broadly defined. It may be the research or evaluation findings of a project; a product (such as a computer program, a series of videodisks or a syllabus for a course); a process or procedure combining several of the above. Content is substance. It can be described. It is the essence of what the audience should receive. Once decided, the level of understanding should be determined.

The "stuff" of dissemination is the content. Content is found in products, practices, programs, and policies. "Products" are usually independent, self-standing instructional materials, such as computer software, laboratory kits, videotapes, audiotapes, and textbooks. "Practices" are teaching methods, usually combined with instructional management procedures that are used in teaching/learning environments. They are

sometimes called "techniques." Content could also be process—the practice of presenting and interacting with substantive information. It could be "knowledge" created from project findings; it could be a synthesis of separate existing knowledge that yields new understanding when analyzed as a whole.

Content ought to be one of the first considerations of a dissemination plan. What is it that will be disseminated? This is the core of the effort; it is the substance. Without it, there can be no dissemination. The content, combined with purpose and audience provide a basis for systemic change. Exhibit 2 presents an example of purpose, audience, and content combined.

Decision Point #4 — Designing Strategies

"Purpose" (Decision Point #1) and "audience" (Decision Point #2) are considered along with "content" (Decision Point #3) prior to determination of the strategy. Exhibit 2 provides an aid to guide this procedure and the previous example (Exhibit 1) illustrates how these elements are used to develop a strategy.

There are many dissemination strategies that can and should be entertained. Many will be familiar and some are new. The following is an illustrative, but not exhaustive, list:

A common failing in the creation of most dissemination plans is to jump to the strategy before considering the prior questions.

- Formal report
- Brochure
- Lecture
- Symposium
- Personal Interview
- Demonstration
- Workshop
- Computer Conference
- Electronic Mail
- Video Conference
- Telelecture
- Film
- Laser Disk
- Exhibit

A common failing in the creation of most dissemination plans is to jump to the strategy before considering the prior questions. A Principal Investigator may be taken with the idea of videoconferencing, for example, and select it as a primary approach without thinking through the match between this strategy and the purpose, audience, and content to be addressed. A

Exhibit 2

An Example of Purpose, Audience, and Content Combined

Purpose?	**To develop guidelines and examples for the teaching of laboratory science at a distance.**
Audience?	**Teachers of chemistry who have taught or are interested in teaching at a distance.**
Content?	**The process of designing, developing, and evaluating materials and techniques for teaching chemistry at a distance.**
Strategies?	**An invitational conference; demonstrations; videotapes; electronic networks; reports at professional meetings.**

Distance education is a significant trend in North American secondary and post-secondary education. The availability of courses when schools or colleges cannot be reached because of location, time, or physical handicap has been made possible through a variety of communication technologies: computers, satellite video, telephones, and combinations of media. Most courses can be redesigned for distance learners by utilizing interactive learning techniques. However, the laboratory experiences are an integral part of most beginning courses in chemistry, biology and physics. When students and teachers are remote from each other, it is difficult to provide opportunities for students to experience the discovery that is part of laboratory work.

A proposal to NSF spelled out the need for a national conference to exchange information among secondary and post-secondary teachers of chemistry who were involved in, or contemplated involvement in, teaching chemistry at a distance. This **audience** would bring materials, experiments, and questions to a 3-day conference to exchange information with colleagues. A resource person from the British Open University, where successful chemistry laboratory programs have been offered at a distance, would be available. The **content** centered on materials, techniques, procedures, and student assessment used in teaching chemistry at a distance.

To ensure further dissemination of the conference results, individual participants would give brief demonstrations of their approach and each would be videotaped for later use by individuals who had not attended the conference. Further, during the conference, the organizer would lead the group through a simulation exercise to create a laboratory kit for one topic in chemistry. The process would be documented and later turned into published guidelines for teachers of chemistry (and perhaps other laboratory sciences) to create laboratory kits for distance learners. Availability of the videotape and the guidelines would be announced in journals read by chemistry teachers. A presentation would be given at the national conference. Individuals attending the conference would be included on a national computer network with bulletin board and electronic mail.

related problem is the over-reliance on a single strategy. For example, we may assume without really analyzing a situation that a written report is the best way to disseminate findings. This assumption is probably based in large part on the fact that our training has predisposed us to this alternative and we are most comfortable with it. It may not, however, be a strategy for success.

Some examples help to illustrate how various strategies can effectively combine media and procedures to "get the word out" to target audiences.

We begin with the case of a research project that has come up with significant findings. Normally the researcher would seek publication in a refereed journal and a formal presentation at a conference of the field most closely related to the study. If a goal is limited to informing other researchers in the same specialized field about the findings, the normal strategies would apply. However, if the researcher is attempting to stimulate related research by other researchers, a symposium might be arranged, followed by an electronic mail network for day-to-day sharing of information and new findings.

Another example focuses on teaching and learning. A mathematics educator has developed and tested new approaches to teaching geometry using microcomputers. His objective is to gain acceptance of the new approaches by secondary school mathematics teachers from urban schools. Presentations are planned for several national meetings that are usually attended by teachers from the defined audience (understanding). Summer workshops are announced for individuals who have expressed interest in the new procedures (adoption) and a computer network is used for follow-up and interaction among those who have adopted the new techniques and materials (implementation).

Decision Point #5—Assessing Impact

After all the planning, the question is: "Has the dissemination effort made any difference?" Has there been any change in the people who were being addressed? What has happened (if anything) as a result of dissemination?

A first step in measuring "success" is to review the criteria upon which "success" will be determined. Start with the previously stated purpose—to what

extent has this purpose been reached? How do you know? If you do not have evidence, how can it be obtained? To what extent are quantitative data helpful and when is qualitative information more useful?

An integral part of any dissemination plan is evaluation of the result.

Too often we are willing to limit ourselves to making information available. An integral part of any dissemination plan is the evaluation of the result. Sometimes such information is not immediately available because it takes time for new users to decide, to adopt, and to gain resources to implement. However, here are some examples of feedback that should be systematically recorded:

- Requests received for more information in writing or by telephone
- Number of individuals (or organizations) that sign-up for training offered by the Principal Investigator
- Number of persons who visit sites where new practices are being used
- Number of invitations for speakers/consultants to come to the site where the new practice is being considered.

Summary

The guidelines presented above provide a general overview of dissemination as it applies to NSF projects. It is intended to assist Principal Investigators in the creation of a dissemination approach. To summarize these suggestions, an overview has been developed to provide tips for dissemination.

References

Crandall, D. P. (1989). Implementation aspects of dissemination: reflections toward an immodest proposal. *Knowledge: Creation, Diffusion, Utilization*, 11(1), 79-106.

Klein, S. S . (1992). A framework for redesigning an R&D-based national education dissemination system in the United States. *Knowledge: Creation, Diffusion, Utilization*, 13(3), 256-289.

Rogers, E. M. (1983). *Diffusion of Innovations* (3rd Edition). New York, NY: The Free Press.

Tips for Dissemination Planning

1. Steps To Be Taken Early in the Project

   A. Draft a global dissemination plan, which includes:

   - The identification of primary and secondary audiences
   - Some indication of the objectives for these audiences: awareness, understanding, adoption/adaption, implementation, or institutionalization
   - Some general ideas of the form of the dissemination for main audiences (monograph, seminar, working group)
   - A preliminary budget: likely time, finances, staff required for dissemination effort.

   B. Contact key members of the main target audience(s) to:

   - Inform them about the study or project
   - Find the convergence between the study or project and their concerns and interests
   - Get a sense of their understanding or conceptual mastery of the problems nested in the research and development questions
   - (Eventually) "sign-up" one or more people who will follow the project and help with its dissemination.

   C. Have a look at the project design and analysis plan to see where:

   - Findings may be generalized to the target audiences
   - Certain findings can answer local questions
   - Outlines will not require too many "translations" to be used by nonspecialists.

2. Steps To Take During the Project

   - Create simple mechanisms (meetings, study day) allowing key users to gradually master the content and significance of the project.
   - Give these non-specialists some intermediary report in a readily understandable form. If possible, do some of this transfer interactively.
   - Control the level of understanding of the project by those within the audience(s) who are likely to carry some of the results and products to their organizations.

- Try to identify the most pertinent information and products for the Principal audience(s), and discuss with them the best channels of communication.

3. Steps During the Concluding Phase of the Project

   A. Elaborate a precise dissemination plan for the principal "target" audiences:

      - Be specific about objectives (enlightenment, change of perspective, action).
      - Be specific about different channels meant to carry the products to key publics: reports, working group, training, articles in a professional journal.
      - Be clear about time, personnel, resources required.
      - Create a realistic timetable.

   B. Work out the responsibilities of key people in the organization:

      - Negotiate a commitment on their part.
      - Make explicit the part of the dissemination that they will carry.
      - Make explicit the contribution that the project team will make.
      - Be explicit about the time, means, and people that will be available to individuals in these units who will be following up on the project.

4. Steps During the Actual Conduct of the Dissemination:

      - General message: structure these dissemination activities as "conversations" with non-specialists about this project not as an "instructional" event.
      - "Nourish" regularly the intermediaries who are disseminating the project locally.
      - Discuss with users the components of the project that can be translated into specific recommendations—that show what can be "done" with the findings or products in specific settings of use.
      - Control the "readability" of documents, along with the level of understanding of information presented interpersonally. Give these tasks to members of the team who can best communicate with nonspecialists.
      - Stay in touch, monitor the dissemination effort until staff, trainers, and key administrators have taken the study into internal councils (for decisions, planning) and have clearly mastered the project and its consequences.

- Plan some of this contact time for informal social contacts; leave some "slack" space in the program of dissemination.
- Produce products with visuals, humor, attractiveness; do not overload with statistics and tables, detailed conceptual analyses, specialized language. Vary oral and written products; think of several ways to illustrate the main conclusions.
- Focus on "alterable" variables—on variables that can realistically be changed in desirable ways.
- Be aware of local sensitivities, hierarchies, politics. They are very important; critical analysis is often received as personal criticism.
- At several points, meet with key users and intermediaries to see how the dissemination effort is progressing, and to determine what needs to be amended.
- If you are interested, follow up on suggestions to pursue this project; be ready to address local questions that go beyond the information you have provided but are pertinent to it.

If the awardee proposes to use grant funds for the purpose of commercial dissemination of any research results/products under the awardee's proposal, the awardee should be aware that the requirements of Articles 17 and 19 of GC-1 will apply as well as any special terms or conditions set forth in any award.

Glossary

Adoption (adopter)	The decision to make full use of innovation as the best course of action available (the person or group who make decisions) (Rogers, 1983, p. 172).
Change agent	The person who introduces and usually facilitates the adoption and implementation of an innovation.
Dissemination	The process of communicating information to specific audiences for the purpose of extending knowledge and, in some cases, with a view to modifying policies and practices.
Gatekeeper	An individual or individuals who withhold or reshape information that they control as it flows into their system (Rogers, 1983, p. 354).
Implementation	Putting an idea, process or product into use.
Innovation (innovator)	An idea, practice or object that is perceived as new by an individual or other unit of adoption (the person who introduces or accepts the idea, practices or object) (Rogers, 1983, p. 11).
Institutionalization	Continued or routine use of an innovation after adoption and implementation.
Strategy	A systematic plan of action to reach predefined goals.